Seabrook Harbor Beach, Seabrook

BEACH WATER QUALITY REPORT
SUMMER 2006

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BACKGROUND

The New Hampshire Department of Environmental Services (DES) has operated a Public Beach Inspection Program, or Beach Program, for over 20 years. An established coastal beach monitoring program began in 1989 and the program continues to provide monitoring on a weekly basis. DES recognizes the health threat at public beaches. As a result, increased beach monitoring and bacteria source tracking have been implemented to further protect public health.

Coastal beaches are monitored for the presence of the fecal bacteria Enterococci. These fecal bacteria are present in the intestines of warm-blooded animals including humans. Fecal bacteria, when present in high concentrations and ingested, can commonly cause gastrointestinal illnesses such as nausea, vomiting and diarrhea. They are also known as indicator organisms, meaning their presence in water may indicate the presence of other potentially pathogenic organisms.

In October of 2000, the United States Environmental Protection Agency (EPA) signed into law the Beaches Environmental Assessment and Coastal Health (BEACH) Act. The BEACH Act is an amendment to the Clean Water Act, which authorizes the EPA to award grants to eligible states. The purpose of the BEACH Act is to reduce the risk of disease to users of the nation's recreational waters. BEACH Act grants provide support for development and implementation of monitoring and notification programs that help protect the public from exposure to pathogenic microorganisms in coastal recreation waters.

DES received grant funding in 2002 to develop and implement a beach monitoring and notification program consistent with EPA's performance criteria requirements published in the *National Beach Guidance and Required Performance Criteria for Grants* document (www.epa.gov/waterscience/beaches/grants). DES has successfully met all requirements and continues to expand the monitoring and notification program. In 2002, only nine coastal beaches were monitored, while in 2003 and 2004, 15 and 16 beaches respectively, were monitored on a routine basis. Fifteen beaches were sampled again in 2005 and 2006. In 2004, volunteers sampled Star Island beach, but circumstances did not allow for this cooperative effort in 2005 and 2006.

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Beach Description

Seabrook Harbor Beach is owned and operated by the Town of Seabrook, New Hampshire. The beach is comprised of sand and overlooks Seabrook/Hampton Harbor. The total beach length is 787 feet. The beach is frequented by residents and vacationers for recreational activities. There are 41 access points (Figure 1) to the beach area from the neighborhood and the main parking lot (this includes all the narrow paths through the grass). Lifeguards are not present. Sanitary facilities are available during the beach season (Figure 1).
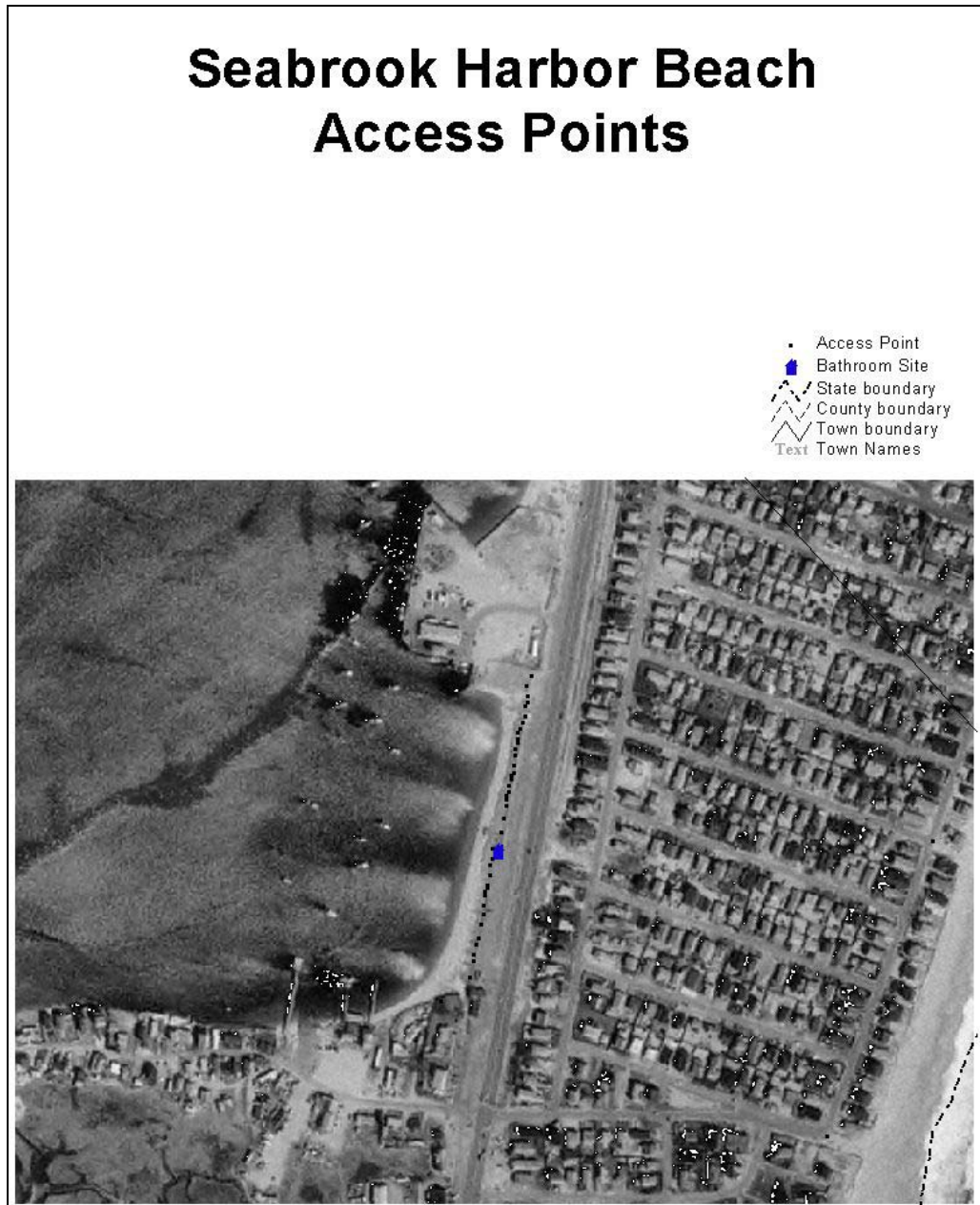

Figure 1. Seabrook Harbor Beach Access Points and Restroom Facilities

Gulls are the waterfowl most frequently observed. Dogs are restricted from the beach area through a town ordinance. The Hampton/Seabrook Harbor area contains a large boat mooring field and several shellfish beds.

Below is a brief description of the sampling stations at Seabrook Harbor Beach, Seabrook. The stations are pictured in Figure 2.

Table 1. Station Description

| Description	Latitude	Longitude
Right sample station: located to the north side of the main beach entrance and to the right of a sign that reads "No Fishing (etc)… from beach". There is a path to the north of the sign to access the beach area. The sample is collected in front of the access point.	42˚ 53' 22.7551"	-70˚ 49' 7.2673"
Center sample station: located between the main beach entrance and restroom facilities. There is a path between the 5th and 6th wooden post south of the main beach entrance to access the beach area. The sample is collected in front of the access point.	42˚ 53' 20.3157"	-70˚ 49' 7.4179"
Left sample station: located to the south of the restrooms and south of a sign that reads "No Bus or Camper Parking". There is a path next to the sign to access the beach area. The sample is collected in front of the access point.	42˚ 53' 18.3092"	-70˚ 49' 8.9922"
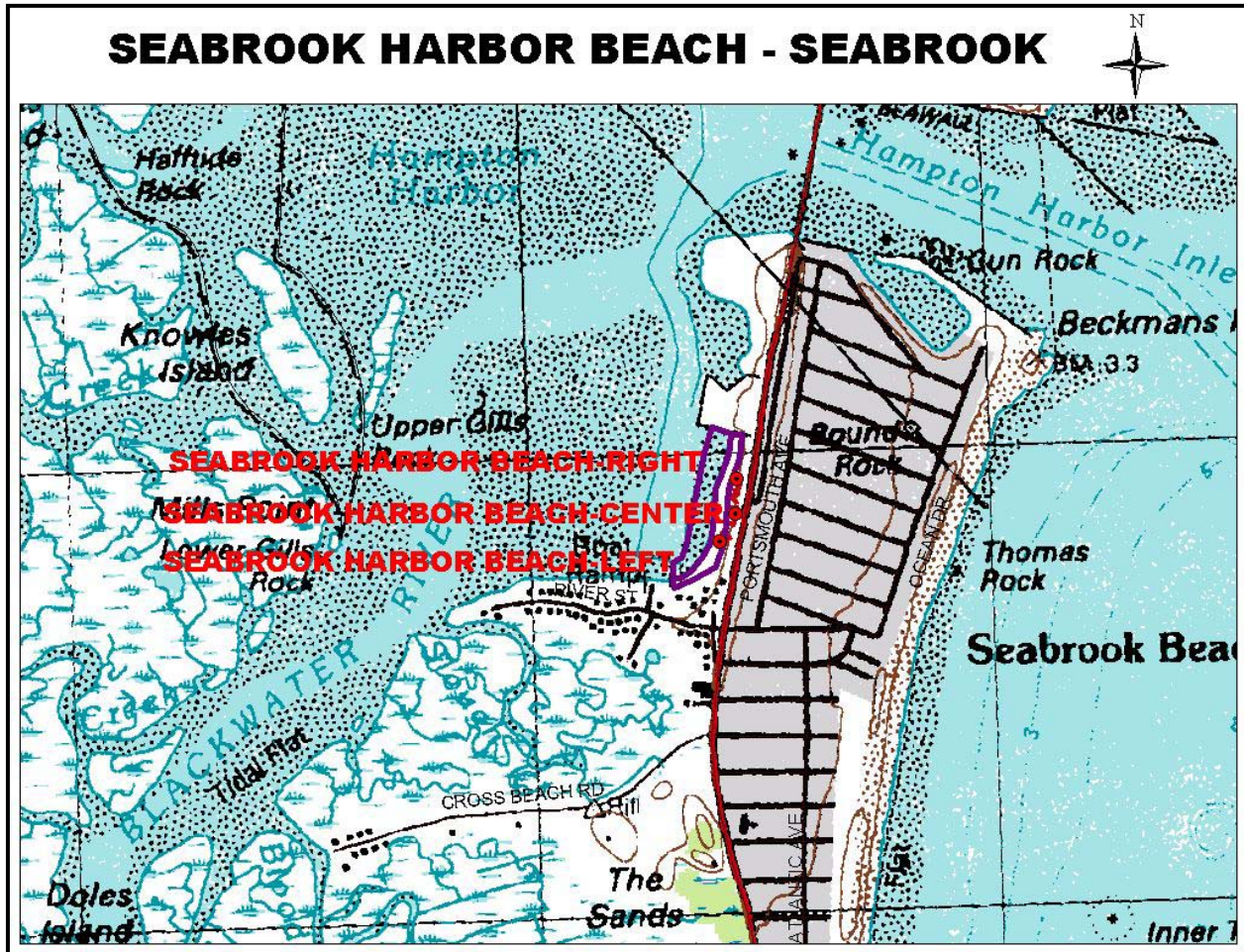
Figure 2. Map of Seabrook Harbor Beach

Tier Status and Sampling Frequency

The Beach Program developed a risk-based beach evaluation process and tiered monitoring approach and implemented this approach during the 2003 beach season. Beach evaluations are conducted annually to determine potential health threats to the public. Evaluations are based on several criteria in three main categories: beach history, microbial pathogen sources, and beach use. The evaluations for the 2006 season included a new criterion to assess beaches. Beaches are now assessed as impaired for bacteria. Impairments are based the most recent version of the Consolidated Assessment and Listing Methodology (CALM) submitted to EPA by DES every two years. The CALM assesses beach units as impaired based on historical exceedances of both the single sample and geometric mean bacteria standards.

Based on these criteria, beaches were assigned a Tier I-Impaired, Tier I or Tier II status in 2006. Tier I-Impaired beaches are high priority and have an increased potential to affect public health, Tier I are medium priority, while Tier II are low priority beaches that have less potential to affect

public health. Beach sample frequency is based on the Tier statuses; Tier I-Impaired beaches were sampled twice per week, Tier I beaches were sampled once per week, and Tier II beaches were samples once every other week in 2006.

Seabrook Harbor Beach is a Tier I-Impaired beach. This ranking is the result of a 2005 beach advisory from elevated Enterococci levels. The beach ranking has changed since the system was implemented in 2002. In the first year of the program, Seabrook Harbor Beach was considered a Tier II beach due to insufficient beach data. Water quality data and additional information were collected during the 2003 season. The 2004 annual evaluation incorporated this data, resulting in a change to Tier I status. The status was again changed after the 2005 summer season to reflect a Tier I-Impaired beach. Because Seabrook Harbor Beach is classified as Tier I-Impaired, it is sampled twice per week.

Water Quality

Beaches are monitored to ensure compliance with State Water Quality Standards. Marine waters are analyzed for the presence of the fecal bacteria Enterococci. Enterococci are known as indicator organisms, meaning their presence may indicate the presence of other pathogenic organisms. The state standard for Enterococci at public beaches is 104 counts/100 mL in one sample, or a geometric mean of 35 counts/100 mL in three samples collected over 60 days. Standard exceedances require the issuance and posting of a beach advisory. Beach advisories remain in effect until subsequent beach sampling indicates safe water quality conditions.

The number of samples collected at each beach is a function of beach length. Beaches less than 100 feet in length are sampled at left and right locations 1/3 of the distance from either end of the beach. Beaches greater than 100 feet in length are bracketed into thirds and sampled at left, center and right locations. Routine sample collection may be enhanced by sampling known or suspected pollution sources to the beach area. Storm event sampling may be conducted at beaches where wet-weather events are expected to affect beach water quality.

The 2006 season's weather can best be described as unpredictable. The 2006 sampling season began May 30. During the month of May, New Hampshire experienced flood conditions typical of a 100-year flood, while the months of June and July were wetter and warmer than normal, and August was unseasonably cool and dry. May experienced over 17 inches of rain setting a record high for the month, and over eight inches of rain fell during June (as recorded at Pease International Tradeport, Portsmouth, N.H.). Precipitation was recorded on 34 days of the 95 day sampling season. Twenty-two beach days (beach hours 9:00a.m to 5:00p.m.) were directly impacted by precipitation.

Seabrook Harbor Beach was sampled twice per week from May 30 through August 31. There were a total of 26 routine inspections and 78 samples collected in 2006.

Table 2 and Figure 3 depict the Enterococci data from each sampling event in 2006. Overall, the summer 2006 Enterococci levels were moderate and within the state's standards for public beaches. There were three occasions where Enterococci levels were above the state standard but beach advisories were not issued. Elevated Enterococci levels did not meet the Beach Program's

advisory posting criteria. The elevated levels on August 21 are likely attributed to an excess of 2.0" of rainfall recorded that day. The rainfall likely washed bacteria laden waters from the tributaries entering the Harbor.

Table 2. Seabrook Harbor Beach Enterococci Data 2006

Sample Date	Station Name	Results (counts per 100 mL)
5/30/2006	Left	20
	Center	10
	Right	10
6/7/2006	Left	20
	Center	20
	Right	20
6/8/2006	Left	50
	Center	70
	Right	20
6/13/2006	Left	10
	Center	10
	Right	10
6/15/2006	Left	10
	Center	30
	Right	30
6/19/2006	Left	10
	Center	10
	Right	30
6/22/2006	Left	10
	Center	10
	Right	10
6/28/2006	Left	10
	Center	10
	Right	10
6/29/2006	Left	10
	Center	20
	Right	140
7/3/2006	Left	10
	Center	10
	Right	10
7/10/2006	Left	10
	Center	10
	Right	10
7/11/2006	Left	10
	Center	30
	Right	10
7/19/2006	Left	10
	Center	10
	Right	10

Date	Location	Value
7/20/2006	Left	10
	Center	10
	Right	10
7/25/2006	Left	20
	Center	10
	Right	10
7/27/2006	Left	10
	Center	10
	Right	10
7/31/2006	Left	10
	Center	10
	Right	10
8/2/2006	Left	10
	Center	40
	Right	20
8/9/2006	Left	30
	Center	10
	Right	40
8/10/2006	Left	20
	Center	40
	Right	20
8/14/2006	Left	40
	Center	10
	Right	10
8/16/2006	Left	10
	Center	10
	Right	10
8/21/2006	Left	90
	Center	100
	Right	130
8/23/2006	Left	10
	Center	10
	Right	10
8/30/2006	Left	10
	Center	10
	Right	10
8/31/2006	Left	10
	Center	10
	Right	10

Figure 3 depicts the relationship between the 2006 Seabrook Harbor Beach Enterococci data and the state standard for coastal beaches.
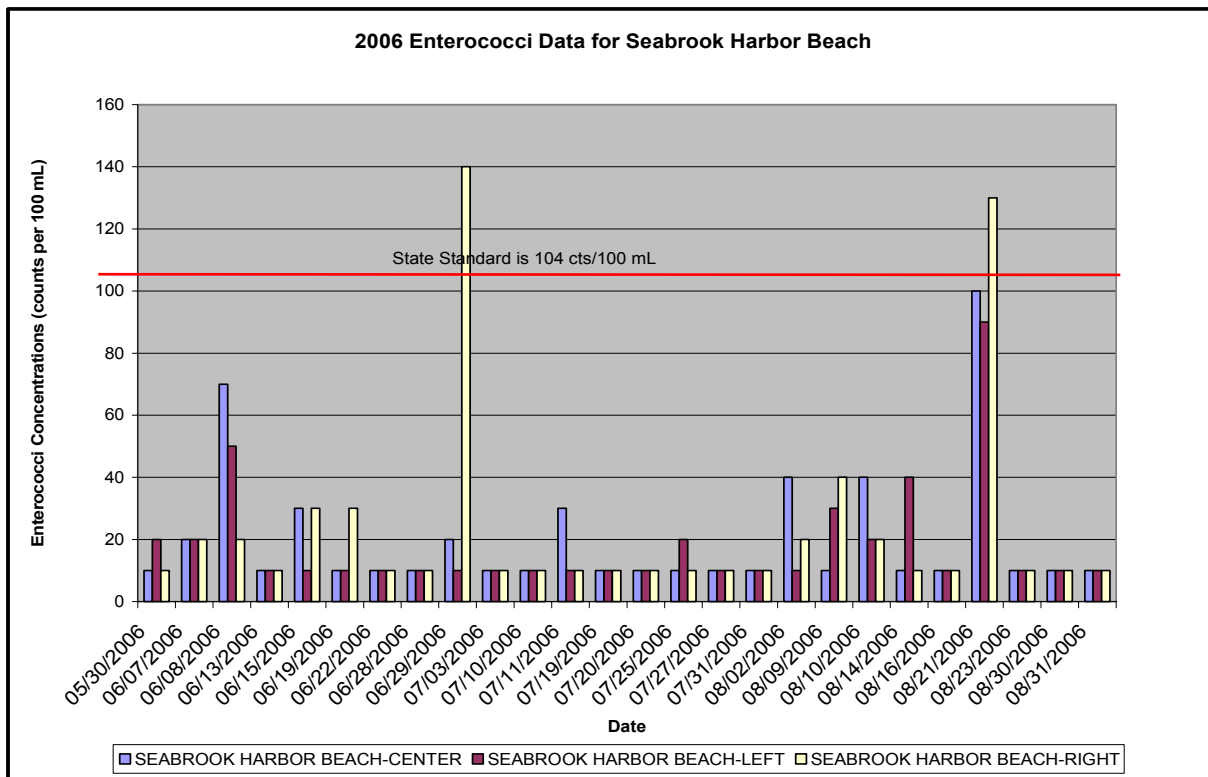

Figure 3. Seabrook Harbor Beach Enterococci Data 2006

Areas of Concern

Fishermen were observed at the public beach area during at least 50 percent of the weekly beach sampling events and continue to be a cause for concern. On one occasion, a shark carcass was observed on the beach. Although no direct evidence indicates that fishermen contribute to bacteria levels; fishing lines and hooks are a threat to swimmers' safety. On many occasions, Beach Program staff had to be cautious not to get caught in the fishing line when collecting water samples.

Boats moored in the harbor continue to be a concern. Between 14 and 29 boats were moored in the harbor during beach inspections. Some of the boats have toilet facilities on board, and although the discharge of waste into the harbor is illegal, there are documented cases of sewage discharges. The DES Shellfish Program has also expressed concerns that boat sewage could threaten shellfish beds in the harbor. Boat discharges to the harbor must be reported to local authorities, DES and the U.S. Coast Guard. There are sufficient boat pumpout stations located along the coast and also a mobile pumpout boat to discharge boat sewage.

Thoughts for the Future

- In previous years the beach area displayed signs indicating "No Fishing." Those signs were not observed this year and it is highly recommended that the Town display the signs and enforce the no fishing zone at the beach area.

- The Seabrook Beach Committee, local businesses, or school group should join DES's Adopt-a-Beach Program. The program would consist of beach clean-ups and water quality monitoring. DES would conduct training sessions and participate in education and outreach activities for the community. If you are interested, please contact Alicia Carlson at (603) 271-0698 or acarlson@des.state.nh.us.

- The town of Seabrook should install pet waste bags to help pick up dog fecal matter. Many people use the parking area to utilize the bathroom facilities and let their dog out to relieve themselves. Installing the pet waste bags would make it more convenient for visitors to pick up after their dogs.

- The Seabrook Beach Committee, the town of Seabrook and DES could partner to install an informational kiosk at the beach. The kiosk could include information about the Beach Program and the surrounding community.

Appendix A

Special Topic 2006

Rapid Assessment Methodology for the Detection of Microbiological Indicators

To assess beach water quality, the Department of Environmental Services (DES) monitors fecal indicator bacteria levels at coastal beaches on a routine basis. Unfortunately, results from sample analysis can take anywhere from 24 to 48 hours. Because it takes at least 24 hours to receive results, beach managers and the public are not informed of water quality problems until after the public may have been exposed. This is an issue facing beach officials throughout the world, and is a priority of the US Environmental Protection Agency (EPA). The EPA, universities and private entities are researching rapid assessment methods to enumerate bacteria and viruses. These methods will allow beach officials to post advisories on the same day water quality is impaired, thus, better protecting public health. There are three different rapid assessment method technologies available: Molecular surface recognition, nucleic acid detection and enzyme/substrate based methods. All rapid assessment methods will take less than two hours to obtain results.

Molecular surface recognition methods capture and/or label the target bacterium by binding to molecular structures on the exterior surface or in its genetic material. Analyses of coastal beach water samples currently employ culture-based methods for the detection of Enterococci bacteria, an indicator for fecal pollution in marine water. The quickest culture-based method takes up to 24 hours to provide results. Now, a new method is being developed to enumerate Enterococci. This new method uses Transcription-Mediated Amplification (TMA) with a fluorescently-labeled probe to amplify a specific region of Enterococci ribosomal RNA (rRNA).

The TMA rapid assessment method is currently being tested in Southern California. Method development is moving quickly and will likely come to execution within five years. Method cost is a significant reason the new technology is not currently employed. Once this procedure is widely and routinely accepted, the expenses should lower. This rapid assessment method is very beneficial as it will allow beach managers to take immediate action towards protecting the public from waterborne pathogen exposure on the same day water is sampled.

Another rapid assessment method being developed for fecal indicator detection is Quantitative Polymerase Chain Reaction (QPCR). QPCR is a nucleic acid detection method that targets genetic material of bacteria, viruses or protozoan indicators. QPCR is used to test for both *E. coli* and Enterococci. Results can be obtained from this method on an average of two hours after sampling. This method has demonstrated 85-90 percent agreement with existing routine methods. QPCR can be used to detect other water quality indicators such as *Bacteroides thetaiotamicron* and human enterovirus. Studies indicate that ratios of *B. thetaiotamicron* may provide useful information as to fecal contamination sources.

The final rapid assessment technology methods available are the enzyme/substrate based methods. These methods pair chromogenic or fluorogenic substrate methods already widely used with advanced optical or electrical detectors. These methods are directed at reducing the incubation periods of current membrane filtration methods. Some of these methods measure excitation and absorbance of the fluorescent metabolite of Enterococci using a fluorometer to speed the detection rate. A popular type of enzyme/substrate method is the Dual-Wavelength Fluorimetry (DWF).

These rapid assessments methods are currently being tested for accuracy, sensitivity and efficiency. Research indicates that these new methods will be made available within the next five years. Once these technologies are made available and laboratories adopt the methods, beach management will have a new tool to better protect public health. With assistance from EPA Beach Grants, New Hampshire will be proactive in employing accepted methods.